

REMARKS

Claims 1-13 are rejected. Claims 1 is an independent claim. Claims 1 and 12 have been amended. Claims 1-13 are pending in the application.

Reconsideration of all grounds of rejection in the Office Action, and allowance of all of the pending claims are respectfully requested in light of the following remarks.

Claims 1, 2, 7-10, 13 stand rejected under 35 U.S.C 102(b) as allegedly anticipated by or in the alternative under 35 U.S.C. §103(a) as obvious over Spaeth (U.S. 5,218,223, hereafter "Spaeth,'223").

Applicants respectfully traverse the rejection of claim 1 over Spaeth,'223 as instant claim 1, now amended, recites, "...**a first electrode** formed at **a first bottom** of the semiconductor substrate; and **a second electrode** formed at **a second bottom** of the semiconductor substrate."

Support for the amendment can be found in FIGs. 2, 6 and 7e and the specification at page 13, lines 8-14 and page 13, line 21-2 to page 14, line 1 -3. More specifically, FIGs. 2, 6 and 7e shows two **n-type electrode 190** located at the bottom of the substrate. The present invention uses these two electrodes to provide a "degree of freedom" for alternative optical coupling solution that is not offered in the prior art.

In contrast, Spaeth,'223 discloses an opto-electronic semiconductor component that does not include first and second electrodes at the bottom of the substrate (See. FIG. 1 – 5). Therefore, Spaeth does not anticipate or teach the use of first and second electrodes at the bottom of the semiconductor substrate, as recited in the base claim.

Claim 1-10, 12, 13 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Spaeth in view of Kato (U.S. 6,246,097 B1). In addition, claim 1-13 stand rejected under 35 U.S.C. §103(a), as being unpatentable over Spaeth and Kato in view of Furuya (US 2002/0084505 A1). The Office action does not provide a specific discussion, providing a specific reference to the prior art as to how it teaches or renders obvious independent claim 1 in either the April 13, 2005 office action or in the pending final office action.

Applicants respectfully traverse the rejection of independent claim 1 over Spaeth and Kato in view of Furuya as the present invention disclosed in claim 1, recites, a light receiving element wherein the semiconductor substrate *inter alia* includes a first and second groove which together control the inclination with respect to an incidence plane of light signal and minimize vertical incident drift (See FIG. 2, A & B).

a. Spaeth does not disclose a second groove which minimizes vertical incident drift.

Spaeth does not teach a first and second groove which together precisely control the inclination with respect to an incidence plane of light signal and minimize vertical incident drift. As can be seen by examining FIG. 1 – 5, Spaeth demonstrates the limitations found in the prior art whereas vertical drift could not be minimized as disclosed in claim 1 of the present invention. As can be seen in FIGs. 1-4 light received from the light cone 10 is clearly disperse over a large and imprecise area of surface 2) and as found in FIG. 5 light is transmitted by the optical device in Spaeth over a large area which requires an optical fiber with a large core size. Spaeth to achieve its objective of transmitting light requires a semiconductor area with a large vertical height. Therefore,

this prior art reference demonstrates the limitations whereas the prior art could not minimize vertical drift as the present invention has overcome.

b. Kato does not disclose a need to include an anti-reflective coating on surface.

Kato only discloses a second groove having a wedge-shaped or barrel-shaped groove which is obtained by a ‘chip breaking’ process having the draw-back of resulting in a rough recess surface and an angle of incident controlled solely by adjusting the position and the shape of the recess. (Col. 4, line 30 to 40) (Col. 53 to 58). Kato does not disclose a first groove. Kato illustrates in FIGs. 7 & 9 that the surfaces 100d and 310d becomes rough during chip breaking, thereby resulting in dispersion of the incident light. To this end, the Kato reference has the drawbacks in that the fabrication process becomes complicated and if height of an optical waveguide is slightly changed since an incidence angle of the light refracted at vertical direction from 310d and 11d becomes large, the incidence angle of the light deviates from an optical axis, thus deteriorating responsivity. The present invention solves the above drawbacks by improving optical coupling efficiency with an anti-reflective coating provided on the first groove.

c. Fuuruya reference does not disclose a need to include a reflective coating on surface B.

Furuuya only discloses a first groove which requires an incoming photo signal to be positioned at an angle relative to the facial angle of the optical device and the photo detection region M, thereby limiting the degree of freedom of coupling an optical fibers or devices.(FIG. Furuya does not disclose a second groove to minimize drift. Furuya demonstrates the drawbacks in the prior art whereas in that the side of the chip can not be

etched by a thickness of the chip, therefore, when the etching becomes deep, a desired angle as originally designed is changed in adhesion between an etching mask and a chip substrate, so that a side angle of the substrate cannot largely be etched. Moreover, Furuya illustrates that incoming light goes directly to the InP substrate from air, an area of a photodiode which is generally low to impact, and should be positioned adjacent to the edge of the substrate. However, the active area of the photodiode has a sensitive influence on the follow-up works of chip breaking and thus causes a decrease in its process yield. Besides, in point of view of the assembly process, since the optical signal is laid in a set position, it is sensitive to a change in position of the fiber so that Furuya is not applicable to the realities of the production process.

Therefore, there is no suggestion of a motivation to combine Spaeth with Kato or Furuya reconsideration and withdrawal of this ground for rejection are respectfully requested.

Applicant respectfully submit that none of the references cited by the examiner, alone or in combination, teaches or show features cited in amended claim 1, as discussed above. As such, applicant respectfully submit that a person of ordinary skill in the art would not have found instant base claims 1 as amended obvious over Speath, in view of Kato and Furuya.

Therefore, reconsideration and withdrawal of this ground for rejection are respectfully requested.

The other claims in this application are each dependent from the independent claim discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention,

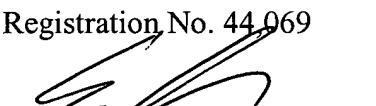
however, the individual consideration of the patentability of each on its own merits is respectfully requested.

The applicants submit that the claims, as they now stand, fully satisfy the requirements of 35 U.S.C. 102 and 103. In view of the foregoing amendments and remarks, favorable reconsideration and early passage to issue of the present application are respectfully solicited.

For all the foregoing reasons, it is respectfully submitted that all of the present claims are patentable in view of the cited reference. A Notice of Allowance is respectfully requested.

Should the Examiner deem that there are any issues, which may be best, resolved by telephone communication, please contact Applicant's undersigned Attorney at the number listed below.

Respectfully submitted,
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Date: December 19, 2005

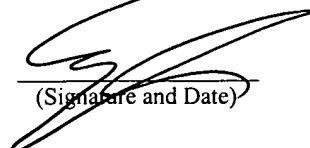
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